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ABSTRACT

An evaluation of a leadership training program for teaching assistants was made by examining the teaching effectiveness of a group of trained assistants in contrast to an untrained group. Assessments of the teaching assistant's classroom behavior were made by student volunteers, in their respective classes, at four time intervals during the term. The results suggest that while the training program was in progress, the teaching assistants who participated in it were more closely associated with effective levels of classroom performance than those who did not participate in the program. Trained teaching assistants continued to be more closely associated with effective leadership through the remainder of the year. (Author/JD)

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THE EVALUATION OF A TRAINING PROGRAM FOR UNDERGRADUATE TEACHING ASSISTANTS

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THE EVALUATION OF A TRAINING PROGRAM
FOR UNDERGRADUATE TEACHING ASSISTANTS

Abstract

Instructors in many basic communication courses have begun to more extensively utilize undergraduate teaching assistants for the purpose of facilitating small group exercises in the classroom. Since most teaching assistants have little or no previous experience in this type of situation, the need for some sort of leadership training is quite evident. The current study evaluates such a training program by examining the teaching effectiveness of a group of trained teaching assistants in contrast to a group of assistants that were not trained. Assessments of the teaching assistant's classroom behavior were made by student volunteers, in their respective classes, at four time intervals during the term. The results suggest that while the training program was in progress, the teaching assistants who participated in it were more closely associated with effective levels of classroom performance than the teaching assistants who did not participate in the program. Moreover, the trained teaching assistants continued to be more closely associated with effective leadership through the remainder of the term.

THE EVALUATION OF A TRAINING PROGRAM FOR UNDERGRADUATE TEACHING ASSISTANTS

Over the past several years, a great deal of time and money has been put into the development of more advanced methods of instruction. Modern technology has enabled educators to increase the quality and quantity of materials that they are able to provide for the large numbers of students in today's schools (Association for Educational Communications and Technology, 1977; Cantwell and Doyle, 1974). The methods used to present these materials are, however, merely extensions of the only two basic techniques that are at the instructor's disposal: directly supplying educational information for student consumption and providing experineces from which the student is expected to master the desired material. This latter technique has been referred to in the literature as the "discovery process" (Ausubel, 1968; Morine and Morine, 1973) and also has informally come to be known as "experiential learning," (Johnson and Johnson, 1975). It has typically been associated with creative and applied areas where such experiences have long been recognized as an appropriate and desirable means of instruction.

Recently, the experiential learning technique has begun to be utilized more extensively in the social disciplines (Barbour and Goldberg, 1974; Johnson, 1972; Pfeiffer and Jones, 1971). The field of communication is in an especially advantageous position to adopt this teaching strategy in certain situations. It seems to be a particularly appropriate means to introduce students to the field. That is, many students enter their first communication class with the notion that since they learned as a child to read, write, speak, and listen, and as

a result are able to adequately function within their environment, communication is not a complex phenomenon and it can therefore be taken for granted (Williams, 1974). It would seem, then, that a major consideration of any introductory communication course would be to eliminate this misconception. Rather than merely trying to explain that to the students, it would appear to be helpful to also demonstrate this point by allowing students to participate in structured exercises where they will actually be confronted with certain designated communication problems. This is, in fact, the approach taken by many departments around the country.

Introductory courses in communication have recently been faced with a dilemma. That is, exercises in communication typically require close supervision. However, these courses have experienced increased popularity among students and curriculum committees. As a result, the enrollment per class has increased such that the instructors are no longer able to provide the personal attention necessary to successfully carry out these exercises. To help resolve this problem, many instructors have begun to utilize both undergraduate and graduate teaching assistants.

Teaching assistants are typically selected according to their: (1) desire, (2) availability, (3) compatibility with the prospective instructor, and (4) quality as a student. None of these criteria are necessarily related to the assistants potential as a group facilitator in the classroom. For many assistants, this is actually their first experience at formally teaching a group of students. Recognizing this as a potential problem, a training program was developed to provide teaching assistants with the leadership skills that they would need in

their classroom role. This paper reports an evaluation of that program. The remainder of the paper will: (1) describe the training program in more detail, (2) lay out a set of procedures for evaluating the program, (3) examine the resulting data, and (4) discuss the implications of these findings for both the training program and the evaluation procedures.

The Teaching Assistants Training Program

Taking into consideration the teaching assistants primary responsibility of guiding exercises and discussions, the focus of the program is on small group processes. In particular, the function of leadership in these classroom situations is emphasized. The program is essentially structured in the same manner as the classes that they will be assisting. That is, exercises are used to help demonstrate key points as well as to give the participants practice at applying their leadership skills in a situation where constructive feedback is provided. The teaching assistants also have the opportunity to actually participate in many of the same exercises that they will ultimately be using in their classrooms.

The program is offered each term and teaching assistants usually take it in conjunction with the class that they are working with. In order to maximize the benefits of their participation, the workship is condensed into the beginning of the term. Four three-hour sessions are held one evening a week for the first four weeks of classes.

Session One

The initial meeting is primarily used to get the participants familiar with one another and with the program. Several warm-up or get acquainted type exercises are used for the purpose of getting the participants to feel more comfortable and to begin to develop an atmosphere of cohesiveness and trust. This is considered to be an important first step because the teaching assistants can become valuable resources to each other as the term progresses. Moreover, they will be asked to discuss one another's leadership performances in later sessions.

An explanation of what is to transpire at the next three sessions is then provided. In particular, they are told that each of them will be given the opportunity to select and lead at least one group exercise. This session ends with a discussion of the participants concerns as teaching assistants and suggestion of topics that they would like to have covered in the workshop that weren't originally scheduled.

Session Two

In the second session, the participants are divided into two groups for the purpose of working on a problem solving situation. The designated leader in one group is instructed to be a socio-emotional type leader while the other group has a leader that has been told to be task-oriented. This is done to demonstrate the general differences regarding efficiency and satisfaction that is typically found with groups having these two types of leaders. In addition, confederates acting as deviants are planted into each group to stimulate a discussion of techniques that may be used to deal with disruptive students in the classroom. The exercise is followed by a discussion of leadership and group dynamics.

Session Three

The third meeting consists of as many of the participants as possible leading the group in an exercise and a follow-up discussion used to draw out the major points covered by the exercise. The group, then, examines each exercise in terms of how well it demonstrated the major points and additional points that could be brought out of the exercise. Suggestions are also made regarding other means of covering the same points. The specific leadership behaviors and strategies of each participant-leader are then discussed. The success of those strategies is assessed and possible alternative strategies are brought up.

Session Four

The remainder of the participants who have not previously had the opportunity to lead a group exercise are able to do so in this final session. The procedures are the same as in the third session. In addition, lecturing tips and other such topics of concern to teaching assistants are attempted to be squeezed in. The participants finish off the workshop by exchanging the experiences that they have already had in the classes that they are assisting.

In summary, the training program briefly described here is designed to prepare undergraduate teaching assistants for the classroom by increasing confidence in and improving their leadership skills as well as providing them with a general understanding of small group processes. In addition, the assistants become thoroughly familiar with the use of exercises as a teaching devise.

Procedure

Instrumentation

McKeachie, Lin and Mann (1971) state that "the ultimate criterion of good teaching is student learning." In this particular case, however, student learning is primarily the responsibility of the instructors and not their assistants. Consequently, the extent of the assistant's teaching effectiveness, as reflected by student learning, may very well be overshadowed by the influences of the specific instructors with whom they are working. This evaluation will, then, focus on the actual classroom performances of the teaching assistants. Specific teaching characteristics will be identified and measured for each assistant.

Kanaga (1978) suggests that metric multidimensional scaling (MMDS) is extremely useful for this purpose. MMDS is based on the fundamental concept of psychological distance (Helm, Messik and Tucker, 1959). That is, the perception of difference or dissimilarity is the basis of the measurement scheme. The multidimensional scaling system, as described in detail by Torgerson (1958), Woelfel (1977), Woelfel and Danes (1977), and Serota (1974) takes pair-wise comparisons of dissimilarity in meanings among a set of concepts and essentially maps that information into a spatial configuration. Once appropriate rotations and translations have been performed, differences in the spatial location of concepts can be interpreted as differences (or changes in over time analyses) in the meanings for those concepts.

For this evaluation, the teaching assistants and the teachers for whom they work were included as two concepts in the measuring instrument. Since the teacher would presumably serve as a role model for the assistants, the differentiation between the two should reflect how well the assistants

were carrying out their role.[1] The concepts leadership and democratic were included to provide more specific information regarding the teaching assistants. That is, effective assistants would be expected to be more strongly associated with leadership. Since the democratic style was presented in the training program as the most appropriate for facilitating group exercises and discussions, effective assistants should also be more closely identified with democratic in the spatial configuration. The final two concepts that were included to reflect the assistants classroom performance are confident and expert. Assuming that confidence is behaviorally manifested, teaching assistance participating in the training program would be expected to display more confidence. The discussions on group processes and leadership should make the participants more knowledgeable in the area that they will be working. Moreover, the importance placed on the followup discussions may stimulate them to better understand the material covered by the exercises they use. Participants in the training program should, then, be more closely associated with expertise.

In all, the questionnaire asked participants to make ratio-judgements of dissimilarity among the following concepts: communication, humanities, physical science, social science, good, me--representing the respondents self-concept (see Woelfel and Danes, 1977), instructor, undergraduate teaching assistant, leadership, democratic, confident, expert, thinking, studying and learning.[2] All possible (N(N-1)/2) non-redundant paired comparisons were used. Participants were asked to make thier responses according to this rule:

> If the difference between red and white is 100 units, what is the difference between concept A and concept B?

Research Design

This evaluation is primarily based on the idea that the success of the program should be determined by the actual classroom performances of the teaching assistants. Twenty sections of the introductory course were offered the term that this study was conducted. The teaching assistants from ten of these sections were randomly selected to participate in the training program while the assistants in the other ten sections served as the control group.[3] Questionnaires were distributed to student volunteers in all twenty sections at approximately three week intervals. Data was gathered four different times during the term.

Results

The major analyses of this study focus directly on the teaching assistant's actual classroom behavior. The emphasis is on the relationship between the teaching assistants and several key attributes or characteristics which are fundamental to their role in the classroom. The following paired comparisons will be investigated for this purpose:

1. Teaching Assistant and Expert
2. Teaching Assistant and Leadership
3. Teaching Assistant and Confident
4. Teaching Assistant and Democratic
5. Teaching Assistant and Instructor

This set of analyses also contains a specific standard for comparison. Student responses regarding dissimilarities between the instructors and these same characteristics were averaged across experimental and control groups at each point in time to create specific criterion scores for each pair. For the teaching assistant-instructor pair, the criterion was, by definition, set at 0.00. The instructors were, themselves, relatively inexperienced and, as was pointed out earlier, did not provide the ideal standard. Consequently, the criterion scores for these analyses

will only serve to provide direction rather than any definitive comparison. In other words, the emphasis will be on differences between the experimental and control groups. The criterion scores will then be used as an indication of whether those differences reflect more favorably on one group or the other. Prior to discussing these analyses, it is important to first examine the measurement system and the success of the experimental manipulations.

Precision of Measure

Theoretically, the concepts not directly manipulated in the experiment would be expected to remain constant across time and experimental conditions. That is, the means for each of the paired comparisons among these not intentionally affected concepts should be the same in both the experimental and control groups as well as at each point in time. Differences are attributable to error of measurement. Averaging across groups and time enable standard errors of measure to be established by the standard deviation for each of the unmanipulated pairs. The coefficients of variability were then calculated according to the following equation: $V = 100 \cdot (s_{xi}/\bar{X})$. This coefficient represents the percentage of measurement error for each pair (Woelfel, Cody, Gillham and Holmes, 1977). These coefficients for all paired comparisons (manipulated and unmanipulated) are presented in Table 1.

Insert Table 1 about here

The coefficients for all pairs ranged from 9.67% to 53.18% with a mean of 21.97%. The mean for the unmanipulated concepts was 20.43% with the largest coefficient (V = 36.70%) being associated with the learning-thinking paired comparison. This result along with the relatively

large coefficients found for other similar pairs such as thinking-studying (V = 35.23) and studying-learning (V = 27.42) are not surprising in light of the sample which primarily consisted of freshmen entering a new social and educational environment. This suggests that the coefficients of variability for the unmanipulated concepts in this study reflect more than merely error of measure. Previous research (Woelfel et al., 1977) has found coefficients averaging below 10% for unmanipulated concepts as vague and illusive as the ones used here. The magnitude of the coefficients in this study may very well be a result of the effects of the overall educational system. In other words, this study deals with only a portion of the educational environment to which the student-respondents were exposed. Educational influences outside the realm of this study should, then, be entirely expected to increase the variability of responses. Thus, the error of measurement in this study is likely to be at least somewhat less than what is reflected by the coefficients of variability.

Manipulations

The coefficients of variability can also be used to examine the success of the experimental manipulations.[4] The mean coefficients of variability for 11 manipulated pairs[5] ($\bar{V}_m$) and the 36 paired comparisons ($\bar{V}_u$) which contained no experimentally manipulated concept were computed. All paired comparisons involving the concepts instructor or me were excluded from this analysis because these two concepts, while not directly manipulated, would be expected to change over the three month period of this study. The Behrens-Fisher statistic for two means with unequal population variances was calculated. For $\bar{V}_m = 25.53$ at N = 11 and $\bar{V}_u = 20.43$ at N = 36, D = 2.31 which is significant at the $p<.05$ level.

These results suggest that, despite the indirect influence of the educational environment, the effects of the manipulations are still quite clear. This is further demonstrated in Table 2 where the mean variability coefficient for each concept with all other concepts has been computed. The two most substantially manipulated concepts, teaching assistant and communication,[6] were among the most variable with coefficients of 32.70 and 24.37 respectively. In fact, teaching assistant had by far the largest average variability coefficient.

Insert Table 2 about here

Instructional Performance

It would seem informative here to first explore trends in the data over time. The time one throught time four data sets for the instructional performance paired comparisons are reported in Tables 3 thru 6 for the control and experimental groups. The only distinctive trend that appears to

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Insert Tables 3-6 about here
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hold across both groups is the presence of a consistent decrease in the mean scores from the third to the fourth point in time. Focusing attention on the experimental group data first, the mean scores for the five instructional performance pairs are relatively stable. The changes that occur are, not very substantial. There are only minimal differences between time one and two scores, with a slight tendency for the latter to be smaller. An increase at time three is then followed by a decrease at the last data collection which makes the final mean score always smaller than its corresponding time one score. The control group data had more variation. There was, however, no uniform pattern for the five paris over time. Probably

the closest thing to an overall pattern is illustrated by the mean score for the teaching assistant-leadership pair which incerases from time one to time two, then generally levels off between times two and three, and finally decreases from the third to the fourth data sets. Although there are noticeable deviations, the data from these pairs, when taken together, roughly fit this pattern.

Differences between these general tendencies for the control and experimental groups can be at least to some extent attributable to the training program. When the initial set of data was collected, only the first week and a half of the term had been conpleted and only the first of the four training sessions had been run. It is not surprising, then, to see that mean scores for the two groups are initially quite similar. Moreover, the differences that had begun to develop several weeks later are quite expected. But the tendency for the trained teaching assistants to become more strongly associated with the specific attribute concepts was only slight at best. Instead, the difference between the experimental and control groups resulted from increases in the teaching assistant-attribute pairs for the control group. In other words, it may have been that rather than helping the trained assistants to be assessed more positively, the training program may have merely prevented them from receiving a more negative assessment. Students may have, at the early stages of the term, overestimated their teaching assistants. The training program could have enabled the trained assistants to quickly attain that level of performance while the lack of such training showed up in the reassessments made by the students in the second data set. Increases in mean scores for the experimental group from time two to time three may be a reflection of the training programs completion. That is, the teaching assistants in the training program may have reached

a peak level of performance while they were learning to improve their classroom skills. A slight decrease in their performance may then occur until sufficient time has allowed them to improve by actually putting their skills to use. Along these same lines, the consistent decrease in the mean scores at the final point in time may merely be a function of experience. That is, all of the teaching assistants, whether they were trained or not, presumably improved their classroom skills as the term progressed. This would, of course, be expected to show more as they gained added experience. Thus, decreases in scores from the third to the final data sets for both groups may be accounted for by direct practical experience.

In discussing more specific differences between the control and experimental groups in relation to the criterion scores, it should first be recalled that the criterion score for each pair was allowed to vary over time. The instructor-attribute mean score for each point in time was used as the criterion. This enabled the criterion scores to adapt to the changing demands of the course as modeled by the instructor. Assuming that improvement in instructional performance should be reflected by mean scores converging on their respective criterion scores, the experimental group would appear to be the most improved over the term. That is, three of its five pairs were closest to the criterion score in the final data set. One of the remaining scores was at that time further than it had previously been in the preceeding three data sets. None of the time four scores for the control group were either closest to or further from the criterion scores. These data additionally show that the mean scores for the experimental group were generally closer to the criterion scores than were their counterparts in the control group.

Mean scores for the experimental group were closest for three of the five pairs in the initial data set (Table 3). Over the next three data collections (Tables 4-6), the experimental group was closer to the criterion in fourteen of the fifteen comparisons.

The indication in these findings that the trained teaching assistants were preceived to be more closely identified with appropriate levels of teaching performance is further supported by several significant findings. Of the six significant differences between the instructional performance pairs for the control and experimental groups, four occurred in the second time period (Table 4). In other words, the assessed difference between the trained and untrained assistants occurred during the time in which the training program was being held. At this time, all but the teaching assist-democratic pair yielded significant differences and even that pair approached significance. In all cases, the mean scores for the experimental group were closest to the criterion. The remaining two significant differences occurred in the final data set (Table 6). It is especially informative to note that the teaching assistant-leadership pair was the only pair that was significant in both the second and fourth data sets. At both times, the mean score was within a single point of the criterion score. It should be further pointed out that while there was no significant difference between the experimental and control group for this pair at time three, there was still a sizeable difference (31.58) between the mean scores. The teaching assistant-leadership pair is of particular importance because it reflects most directly on the training program which, of course, was specifically intended to improve the teaching assistants' leadership skills.

In summary, there were fifteen possible comparisons between the

mean scores for the control and experimental group after the initial data set. Six were found to be significant and four others had substantial differences of over 30.00 which approached significance. In all but one case, significant or not, the mean for the experimental group was closest to the criterion. While these results are encouraging, the lack of additional significant findings suggests that caution against over interpretation should be exercised. However, two conclusions do seem to be warranted. First, the trained teaching assistants were perceived to be more closely identified with appropriate levels of teaching performance during their participation in the training program. Secondly, the trained teaching assistants were more strongly associated with the concept of leadership during and after their participation in the training program.

Discussion

The results of this evaluation seem to suggest that the training program was at least somewhat successful. That is, teaching effectiveness was assessed more positively for those teaching assistants who participated in the training program. However, it should be recalled that student learning is the ultimate criterion for teaching effectiveness and that this information could not be adequately obtained in this particular situation. Extensive reviews of empirical research by Doyle (1975) and Costin et al. (1972) show rather convincingly that students are quite capable of making the type of assessment asked of them in this study. But without additional information regarding the influence of the teaching assistants on student learning, the findings reported here should not be considered conclusive.

In addition to their reflection on the overall success of the training program, the results of this evaluation have several informative implications. There is, for example, an exceptionally close resemblance between the mean scores at each point in time for the teaching assistant-leadership and teaching assistant-confident pairs. With the exception of the third data set in the control group, where the difference was 26.81, the scores are otherwise very similar. The differences range from .35 to 3.82 in the experimental group to a high of only 9.51 in the control group. The two pairs also follow identical patterns over time. While this similarity may merely reveal a strong covariation, it may also be an indication of the importance of building the teaching assistants' confidence in their leadership skills. In other words, at least perceptions of the teaching assistants' leadership ability may be in a large part dependent upon the confidence that they display in the classroom.

Focusing more directly on the training program, it should be pointed out that five of the seven significant differences between the control and experimental groups for the instructional performance pairs occurred during the time in which the teaching assistants were actually participating in the training program. At that time, they were perceived to be more closely associated with effective levels of instruction. However, these differences did not hold up over time. This would seem to indicate that while it is important to provide the teaching assistants with early training that they can put to immediate use, it is also important to not prematurely terminate that training. Additional, less lengthy, sessions held periodically throught the remainder of the term may be helpful in improving or at least maintaining the levels of teaching performance attained during the early part of the training program.

The need for establishing some sort of standard for assessing teaching performance is clearly demonstrated by the teaching assistant-democratic pair in the final data set (Table 10). For this pair, the criterion score is 59.14 with the mean score for the control and experimental groups being 43.66 and 77.76 respectively. The criterion score is near the center of the difference between the control and experimental groups. The teaching assistants from the two groups are then almost equally distant from what is considered to be the optimal level of teaching effectiveness for this particular attribute. However, improvement for the untrained teaching assistants would require them to become more democratic. The trained teaching assistants, on the other hand, appear to have appropriated too much of this characteristic and as a result have begun to become counter productive. Improvement for them would call for a less democratic style and possibly more authoritative leadership. Without such a standard, as is typically the case in current evaluation procedures (Genova, Madoff, Chin and Thomas, 1976), the changes that are necessary for improvement are not clearly defined. In the current example, the position of the trained teaching assistants could easily be misinterpreted as being superior to that of the untrained teaching assistants. Improvement may then be associated with becoming more democratic which for the experimental group would lead to less effective instruction. Thus, the establishment of a standard representing optimal levels of teaching performance for relevant attributes would appear to be an essential ingredient in the evaluation of instruction.

FOOTNOTES

[1]The teacher probably does not represent the ideal standard, but the goal of perceived equivalence with the teacher would in most cases by considered a substantial step in that direction.

[2]The additional concepts that were included but not discussed were intended to minimize participant sensitivity to the purpose of the study by placing the questionnaire in a more general educational context.

[3]The division was made according to section rather than individual assistants because six sections had two assistants. It was felt that to have one assistant participating in the workshop and the other not participating might cause some unnecessary problems. That is, the untrained assistant may indirectly benefit from the workshop by picking up on what the trained assistant had learned. Moreover, the repeated exposure to both assistants could make it difficult for students to make a clear distinction when assessing the assistants separately. The repeated exposure to both assistants would also make it difficult to attribute the extent of student learning to the teaching effectiveness of one teaching assistant or the other.

[4]Coefficients for the manipulated pairs are expected to reflect differences across conditions and time resulting from experimental manipulations in addition to error of measure. Assuming that measurement error is reasonably equivalent for manipulated and unmanipulated pairs, differences in the coefficients for these two groups are directly attributable to manipulation effects.

[5]In addition to the five pairs mentioned, the following six other paired comparisons were considered manipulated because they were taught as part of the course content: communication and social science, communication and leadership, communication and democratic, leadership and democratic, communication and good, and communication and me.

[6]Communication was considered to be manipulated because it was the general topic of the course and as such, student meanings for it would be expected to change as a result of exposure to course content.

Table 1. Coefficients of Variability ($V=100(S/\bar{X})$) for Mean Dissimilarities of Experimental and Control Groups Across Four Points in Time

	Expert	Instructor	Studying	Thinking	Me	TA	Physical Science
Expert	0.00						
Instructor	19.67	0.00					
Studying	17.40*	17.95	0.00				
Thinking	22.28*	12.22	35.23*	0.00			
Me	22.15	20.08	19.00	18.10	0.00		
TA	32.47	22.84	23.72	50.60	30.47	0.00	
Physical Science	21.43*	12.55	21.91*	19.59*	20.94	20.92	0.00
Leadership	24.24	22.81	18.41	24.09	15.54	36.66	15.61
Learning	19.31*	20.32	27.42*	36.70*	20.97	42.77	28.84*
Democratic	16.17	22.20	12.85	23.16	16.33	31.12	25.04
Humanities	16.81*	16.51	19.93*	12.10*	16.59	28.38	11.54*
Good	28.00*	24.34	29.00*	20.24*	19.41	29.83	20.26*
Confident	25.97*	24.41	13.17*	25.02*	11.82	26.87	20.38*
Social Science	15.85*	19.72	18.42*	21.27*	14.57	28.02	16.30*
Communication	15.95	23.40	21.42	23.02	19.60	53.18	24.11

Table 1 (cont'd.)

	Leadership	Learning	Democratic	Humanities	Good	Confident	Social Science	Communication
Leadership	0.00							
Learning	23.50	0.00						
Democratic	25.06	19.34	0.00					
Humanities	19.14	19.26*	18.12	0.00				
Good	29.22	9.67*	27.65	11.23*	0.00			
Confident	19.19	31.52*	16.66	10.03*	22.04*	0.00		
Social Science	18.84	17.56*	22.41	16.83*	11.59*	21.53*	0.00	
Communication	28.75	36.13	18.77	18.51	22.46	19.62	16.21	0.00

* = unmanipulated paired comparisons

Table 2. Means and Standard Deviations for the Variability Coefficients of Each Concept

Concept	Mean	Standard Deviation
Teaching Assistant	32.70	9.86
Learning	25.24	9.06
Thinking	24.54	10.20
Communication	24.37	9.81
Leadership	22.93	5.84
Good	21.78	6.93
Expert	21.26	5.03
Studying	21.13	6.10
Democratic	21.06	5.07
Confident	20.59	6.12
Physical Science	19.96	4.71
Instructor	19.93	3.95
Me	18.97	4.37
Social Science	18.51	4.00
Humanities	16.78	4.70

Table 3. Mean Distances, Standard Deviations, and Sample Sizes Among Pairs of Instructional Performance Pairs for Experimental and Control Groups at Time One

Concept Pair	Criterion	Condition Control	Experimental
Teaching Assistant and Expert	56.586 (82.305) 251	116.045 (193.677) 137	92.924 (159.082) 105
Teaching Assistant and Leadership	35.498 (77.221) 243	50.351 (61.432) 165	53.610 (116.175) 164
Teaching Assistant and Democratic	63.134 (112.021) 245	54.242 (41.522) 153	65.050 (125.295) 158
Teaching Assistant and Confident	39.869 (84.018) 237	42.092 (38.032) 163	57.426 (122.463) 162
Teaching Assistant and Instructor	0.000	57.090 (98.371) 166	50.995 (115.575) 176

$^{*}p < .05$
$^{**}p < .02$
$^{***}p < .01$

Table 4. Mean Distances, Standard Deviations, and Sample Sizes Among Pairs of Instructional Performance Pairs for Experimental and Control Groups at Time Two

Concept Pair	Condition		
	Criterion	Control	Experimental
Teaching Assistant and Expert	47.751 (66.915) 209	108.774*** (207.141) 164	55.376 (40.401) 133
Teaching Assistant and Leadership	45.062 (102.259) 203	83.537** (185.220) 160	45.748 (57.982) 123
Teaching Assistant and Democratic	46.333 (81.879) 207	94.023 (211.379) 164	60.114 (108.890) 122
Teaching Assistant and Confident	33.792 (42.758) 197	74.032* (159.258) 157	45.168 (63.957) 125
Teaching Assistant and Instructor	0.000	64.218* (151.292) 165	35.303 (59.600) 135

* $p < .05$

** $p < .02$

*** $p < .01$

Table 5. Mean Distances, Standard Deviations, and Sample Sizes Among Pairs of Instructional Performance Pairs for Experimental and Control Groups at Time Three

Concept Pair	Condition		
	Criterian	Control	Experimental
Teaching Assistants and Expert	70.649 (133.570) 97	99.356 (183.896) 73	66.507 (57.965) 73
Teaching Assistants and Leadership	48.536 (80.246) 97	89.780 (183.896) 73	58.203 (76.486) 69
Teaching Assistants and Democratic	58.980 (92.059) 103	91.218 (180.133) 78	74.042 (134.857) 71
Teaching Assistants and Confident	44.917 (61.176) 97	62.974 (96.176) 76	58.132 (121.434) 68
Teaching Assistant and Instructor	0.000	46.618 (51.140) 76	47.821 (44.501) 39

* $p < .05$
** $p < .02$
*** $p < .01$

Table 6. Mean Distances, Standard Deviations, and Sample Sizes Among Pairs of Instructional Performance Pairs for Experimental and Control Groups at Time Four

Concept Pair	Condition		
	Criterion	Control	Experimental
Teaching Assistants and Expert	52.153 (93.507) 131	87.417 (147.213) 96	57.240 (68.060) 96
Teaching Assistants and Leadership	33.075 (36.334) 139	60.071** (104.591) 99	33.848 (26.131) 92
Teaching Assistants and Democratic	59.137 (137.246) 141	77.758** (138.894) 99	43.663 (29.432) 92
Teaching Assistant and Confident	35.474 (60.381) 135	51.134 (76.479) 97	34.194 (30.817) 93
Teaching Assistant and Instructor	0.000	49.320 (90.556) 97	39.638 (39.402) 94

* $p < .05$
** $p < .02$
*** $p < .01$

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